APPLICATION FOR PATENT

TITLE: WATERCRAFT LIFTS AND CABLE TIE-OFF DEVICE FOR WATERCRAFT LIFTS

INVENTOR: WILLIAM GOLDEN

[001] The present invention is directed to watercraft lift assemblies comprising novel cable tie-off devices. In certain embodiments, the cable tie-off devices are mounted onto the vertical pilings of the watercraft lift assembly without the use of bolts or other fasteners that directly penetrate the outer surface of the vertical pilings. Consequently, the integrity of the vertical piling is better maintained compared to conventional cable-tie devices.

BRIEF DESCRIPTION OF THE FIGURES:

[002] Fig. 1 is a perspective view of a watercraft lift assembly employing embodiments of the inventive cable tie-off devices.

[003] Fig. 2 is an enlarged exploded top view of a vertical piling showing a pile cap embodiment of the inventive cable tie-off device.

[004] Fig. 3 is an enlarged view of a portion of a vertical piling showing an embodiment of a cable-tie off device secured thereon.

[005] Fig. 4 is a perspective view of a vertical piling showing the pile cap embodiment of the cable tie-off device illustrated in Fig. 2.

[006] Fig. 5 is an enlarged view of a vertical piling showing a second embodiment of a cap for mounting a winder assembly of the watercraft lift assembly.

[007] Fig. 6 is an exploded view of the wedge and housing portions of the cable tie-off device illustrated in Fig. 3.

[008] Fig. 7 is an exploded view of the wedge and housing portions of the cable tie-off device illustrated in Fig. 6 with a cable mounted thereon.

[009] Fig. 8 is an enlarged view of the platform portion of cable-tie device.

[010] Fig. 9 is an exploded view of the cap embodiment shown in Fig. 4 mounted on a round vertical piling.

[011] Fig. 10 is an exploded view of the cap embodiment shown in Fig. 4 mounted on a rectangular vertical piling.

[012] Fig. 11 is a perspective view of one embodiment of the watercraft assembly that may be employed with the cable-tie off device.

[013] Fig. 12 is a detailed, partially exploded view of the second pulley assembly connected to one of the transverse beams of the lifting frame.

[014] Fig. 13 is a perspective view of a motor/winch assembly illustrating an exemplary tie off of the first cable.

[015] Fig. 14 is a perspective view of a second embodiment of the watercraft assembly that may be employed with the cable-tie off device.

[016] Fig. 15 is a perspective view of a third embodiment of the watercraft assembly that may be employed with the cable-tie off device.

[017] Fig. 16 is a perspective view of the first pulley in combination with the first cable in the first and third embodiments of the watercraft assembly that may be employed with the cable-tie off device.

[018] Fig. 17 is a perspective view of the cable tie-off in combination with the first cable in the second embodiment of the watercraft assembly that may be employed with the cable-tie off device.

[019] Figs. 18A and 18B are enlarged views of other cable terminal end tie offs

[020] Fig. 19 is a enlarged view showing a portion of one of the transverse beams of a watercraft a assembly that may be employed with the cable-tie off device with a portion of the support frame secured thereon.

[021] Fig. 20A is a perspective view of a motor/winch assembly of the watercraft assembly that may be employed with the cable-tie off device.

[022] Fig. 20B is a perspective view of a spool bracket portion of the motor/winch assembly that may be used in the watercraft assembly that may be employed with the cable-tie off device.

DETAILED DISCUSSION OF THE PREFERRED EMBODIMENTS:

[023] The present invention, in certain aspects, is directed to watercraft lift assemblies, and more specifically, to improvements in cable tie-off devices used to secure the free end of lifting cables used in the pulley assemblies of watercraft lifts.

[024] The following discussion refers specifically to the improved cable-tie device. Referring now to Fig. 1, the present invention comprises a watercraft lift assembly **10** employing, in part, a series of cable tie-off devices **20, 200**. It is important to note that the present invention is not limited to the watercraft lift design depicted in Fig. 1 in terms of size, number and arrangement of vertical pilings, transverse watercraft support beams, and lifting cables, for example, but may comprise other watercraft lift designs, such as those discussed further below. Moreover, the term "watercraft," as used herein, refers to any vehicle designed for operation on any waterway and includes, but is not limited to, outboard motor boats, jet skis, inboard motor boats, pontoon boats, sailboats, jet boats, canoes, and the like. For ease of illustration, the watercraft is not shown in the figures.

[025] Referring now to Figs. 1 and 3, one embodiment of the cable tie-off device **20** comprises a jacket **21** secured about the outer sides of the vertical piling **11**. The jacket **21** further comprises first and second opposing brackets **22** configured to engage the sides of the piling. As shown in Fig. 3, the brackets **22** are substantially C-shaped; however, it will be recognized by those of ordinary skill in the art who first have the benefit of this invention's teachings and suggestions that the shape of the brackets may be modified if desired, in particular to conform better to the configuration and size of other vertical pilings, for example. Extending from the end of the brackets, and integral therewith, are fastening portions **23**. When the brackets of the jacket are placed around the piling, adjacent fastening portions **23** of the respective brackets are aligned as shown in the figures and secured to one another by a bolt, screw, or similar fastener **60**.

[026] Extending from the brackets is a platform **24** configured to maintain the cable **13** of the lifting device. Specifically, the platform **24** comprises a slot **30** and a housing portion **25** extending from, and in communication with, the slot **30**. The platform **24** is also shown in Fig. 8, wherein the housing portion is removed to better illustrate the slot **30** [Note that the platform may be integrally welded, for example, to the bracket or it may be a separate piece fastened to the bracket through holes **31** in the base **32** of the platform, as

illustrated in Fig. 8.] The combination of the slot **30** and housing portion **25** are designed to maintain a wedge **40** about which the free end of a lifting cable **13** is carried, as shown in Figs. 3 and 6-7. As better shown in Figs. 6-7, the wedge **40** has a grooved periphery **41** within which the cable **13** is carried. The housing portion **25** may be oriented above the slot, as shown in Fig. 3, for example, wherein the jacket is secured near the proximal end **14** of the piling **11**, with the cable **13** hanging below the jacket **22** (see also device **20** in Fig. 1). Alternatively, the housing portion **25** may be oriented below the slot **30**, as shown at device **200** in Fig. 1, wherein the jacket is secured near the distal end **15** of the piling with the cable **13** hanging above the jacket. In both embodiments, the force applied upon the cable during operation of the watercraft lift will cause the wedge **40**/cable **13** combination to lock within the housing portion **25**, thereby minimizing any slippage of the cable during operation of the watercraft lift. For example, the weight of the beams **12** (and watercraft if carried thereon) maintain the wedge/cable combination within the housing portion in the proximal device **20**, while the upward driving force applied by operation of the winch assembly **70**, winding the cable **13** upward to lift the beams **12**, will maintain the wedge/cable combination within the housing portion in the distal device **200**.

[027] The figures illustrate the provision of the wedge-shaped housing portion **25** for carrying and maintaining the cable wedge **40** therein, as discussed above, and this embodiment is preferred for optimal stability. However, in some aspects of the present invention, the housing portion may be omitted from the design entirely without departing from the spirit of the invention. In these embodiments, the wedge/cable combination is maintained within the slot **30** by the upward or downward force pulling the wedge/cable firmly within the slot.

[028] It is important to note that the inventive device **20, 200** may be attached to any type of vertical piling **11** used in watercraft lift assemblies, regardless of shape or material of the piling. For example, the device **20, 200** may be secured to wood pilings, concrete pilings, metal pilings, and the like. In addition, while Figs. 1 and 3, for example, illustrate the device **20** secured to a round piling, the device may be also be secured to a square or rectangular shaped piling, and if desired, the design of the bracket may be modified to better conform to the square or rectangular configuration of such pilings.

[029] Figs. 2, 4, and 9-10 illustrate another embodiment of the inventive cable tie-off device designed for attachment to the top (i.e. proximal end) of the piling. Specifically, the device comprises a cap **50** mounted onto the proximal end **14** of the piling. In Figs. 4 and 10 the cap **50** may be rectangular shaped to conform to the rectangular end of the piling. Alternatively, the rectangular cap may be secured to round vertical pilings (see Figs. 1 and 9). The cap **50** comprises a top portion **53** and side walls **54** that extend downward entirely around the vertical pilings sides as shown. The length **(L)** of the side walls is not critical, but should be sufficiently long enough to prevent the cap from sliding off the end of the piling, both during the operation of the watercraft lift as well as when there is a relatively light downward force being applied to the cap, the case being, for example, when there is no watercraft being carried by the lift.

[030] Extending from at least one side wall **54** of the cap **50** is a platform **51** configured to maintain the cable **13** of the lifting device. As illustrated in Figs. 4, 9-10, the platform **51** may be identical to the platform **24** shown in Fig. 3, for example. As in the embodiment shown in Fig. 3, the platform **51** comprises a slot **55** and a housing portion **52** extending from, and in communication with, the slot. The housing portion **52** may be identical to the housing portion shown in Fig. 3. As discussed above with respect to the cable tie-off embodiment shown in Fig. 3, the platform **51** may be integrally welded, for example, to the side walls **54** of the cap or it may be a separate piece fastened to the side walls **54** through holes in the base of the platform.

[031] The combination of the slot **55** and housing portion **52** are designed to maintain a wedge **40** about which the free end of a lifting cable **13** is carried. The wedge may be identical in design and use to that illustrated in Figs. 3 and 6 and discussed above. Because the cap **50** is secured to the proximal end of the piling, the housing portion **52** is necessarily oriented above the slot, as shown in Figs. 2, 9-10, with the cable **13** hanging below the cap **50.** As discussed above for the device **20**, the force applied upon the cable during operation of the watercraft lift will cause the wedge **40**/cable **13** combination to lock within the housing portion **52**, thereby minimizing any slippage of the cable during operation of the watercraft lift. For example, the weight of the beams **12** (and watercraft, if carried thereon) maintain the wedge/cable combination within the housing portion **52** of the cap **50**.

[032] For optimum fit, it is preferable that the inner width of the cap be only slightly larger than the respective width **w** or diameter **d** of the piling. Such dimensions allow for an essentially friction fit of the cap onto the proximal end **14** of the piling **11** which, in conjunction with the side walls **54** of the cap, prevent the cap from sliding off the piling **11** during operation of the watercraft lift assembly as well as when the lift assembly is not in use (see Fig. 9). If desired, however, additional fasteners **80** may be used to secure the cap **50** to the proximal end **14** of the piling, as shown in Fig. 10, for example.

[033] Fig. 5 illustrates a cap **500** similar to that depicted in Figs. 2, 4, 9-10, and comprises a top portion **530** and side walls **540** that extend downward entirely around the vertical piling's sides. The difference between the two caps, however, is that instead of a cable-tie off device being secured to the cap **500**, a winder assembly **70** is mounted onto the side walls **540** of the cap. For the reasons discussed above for the cap embodiment illustrated in Figs. 2, 4, and 9-10, the inner diameter or width of the cap **500** is preferably only slightly larger than the respective diameter or width of the piling. Moreover, like the cap **50** embodiment discussed above, the cap **500** for the winder assembly may be secured to rectangular vertical pilings (Fig. 5) or round pilings (Fig. 1). It is important to note that while Fig. 5 illustrates a winder assembly **70** secured to the cap **500**, other devices may also be mounted thereon, including, but not limited to, motors.

[034] The following discussion is with reference to specific watercraft lift designs that may be employed with the inventive cable tie-off device described above.

[035] Fig. 11 illustrates the first embodiment of a watercraft lift assembly which, for ease explanation, is referred herein as the "three-post/dual motor embodiment." This embodiment comprises a support structure to which the motor/winch assemblies and terminal ends of the lifting cables are mounted or secured, respectively. Specifically, the support structure of the three-post/dual motor design illustrated in Fig. 11 comprises two vertical pilings **11** positioned on the proximal side **P** (i.e. dock side) of the watercraft (not shown). The vertical pilings are typically spaced about 7 feet to 12 feet from one another. A third vertical piling **12** is positioned on the distal side **D** of the watercraft (i.e. a distance away from the dock). As shown in Fig. 11, elongated transverse lifting beams **13** are positioned between the pilings by a pair of pulley assemblies and cables.

[036] The embodiment illustrated in Fig. 11 comprises a pair of motor/winch assemblies **14,** each of which is secured separately to one of the proximal pilings **11**. Each winch assembly **14** contains a rotatable spool **15** about which a length of lifting cable **20** is wound. In one embodiment, the spool is secured to a bracket piece **18** which in turn is secured to the motor assembly **17**. One end of the cable is secured to the spool while the other end is tied off near the top end **11a** of the piling (not shown) or to the winch assembly, as shown in Figs. 11 and 13. The cables may be stainless steel aircraft cable, nylon, or other types of cables or ropes known by those of ordinary skill in the art. The lifting cable **20** is further mounted onto a pulley wheel **30**, as shown in Figs. 11 and 16. Preferably, about 12 feet to about 24 feet of cable are employed on this portion of the pulley assembly. The first pulley wheel **20** is mounted onto a bolt **21** which, in turn, is used to secure a pair of parallel pulley housing plates **22** to one another. The first pulley wheel **31** is clearly illustrated in Fig. 16, but is hidden from view by one of the parallel plates **22** in the remaining figures. In addition, only a small portion of parallel plates **22** are shown in Fig. 11; however, the plates are more clearly shown in Figs. 12 and 16. When the motor **14b** is actuated to operate the winch **14**, the spool rotates to release or wind the lifting cable **20** along the pulley wheel **30**. It will be understood by those of ordinary skill in the art that all of the pulley wheels employed in all of the embodiments of the present invention are conventional pulley wheels, each having a sufficiently wide groove **31** for maintaining the lifting cables as they move thereon (see Fig. 16, for example).

[037] Also secured between the parallel plates **22** is a second pulley wheel **32** positioned subjacent to the first pulley wheel **30**. The second pulley wheel **32** is mounted to a second bolt **27** that also serves to secure the parallel plates **22** to one another, as shown in Figs. 11 and 12. A second cable **33** is employed, wherein one end is secured to one of the vertical pilings **11** below the transverse lifting beams **13** (at **500**, for example) and the other end is secured near the top end **12a** of the third vertical piling (at 500, for example) as shown in Fig. 11. The remaining length of cable is aligned, in succession, over the second pulley wheel **32**, beneath a third pulley wheel **34**, along the top surface of the transverse beam, and beneath a fourth pulley wheel **35** mounted to the distal end **13a** of the transverse beam, as shown in Figs. 11 and 12. A preferred length of this second cable

is 26 feet to 36 feet, although the skilled artisan, will recognize that the length may be varied depending upon the size of the watercraft. Moreover, the third and fourth pulley wheels **34,35** are preferably mounted onto brackets **40** that are integral with opposing ends of the transverse beams **13**. Preferably, the latter pulley wheels **34, 35** are mounted within brackets **40** using hollow bolts **50** with zerk fittings.

[038] When the motor/winch assembly in this embodiment is actuated via a single switch (not shown) to lift the transverse lifting beams **13**, the cable **20** pulls the plates **22** upward, thereby synchronistically raising the beams upward. Lowering the transverse beams operates in the same fashion.

[039] Fig. 12 more clearly illustrates the pulley and cable components of the inventive lifting apparatus. Not shown in Fig. 11 but shown in Fig. 12 are a second pair of parallel plates **41**. The lower ends **22a** of the first pair of parallel plates **22** are secured via a bolt **27**, as shown. The second pair of plates **41** provide for more stability during operation of the lift assembly. In addition, the lift assembly preferably includes a cable tunnel **60** configured to protect the second cable **33** from damage. A vertical stabilizing member **63** may also be secured to each of the transverse beams to minimize side-to-side movement of the boat hull. These features are preferably present in all of the embodiments illustrated and described herein.

[040] Fig. 14 illustrates a second embodiment which, for ease of explanation, is referred to herein as the "three-post,/single motor design" **300**. In this embodiment, three vertical pilings **301** used for structural support are employed. Specifically, the three-post/single motor embodiment illustrated in Fig. 14 comprises one vertical piling positioned on the dock-side or proximal side **P** of the water craft (not shown). Two other vertical pilings **302** are positioned a distance away from the dock, for example, and more particularly on the distal side **D** of the dock. These vertical pilings are typically spaced about 7 feet to 12 feet from one another. In this embodiment, the transverse lifting beams for carrying the watercraft are positioned between the pilings as shown in Fig. 14.

[041] A winch assembly **14** is mounted near the top end of the first vertical piling **301**. The winch assembly includes a pair of rotatable spools **141** and a motor **14b** for turning the spools. A first cable **200** is wound about each of the spools **141**, with one end of the cable secured to the spool and the other end secured to a bolt **50** connecting the two

parallel pulley plates **22**, as shown in Figs. 14 and 17. Preferably, these cables are from about 12 feet to about 24 feet in length, depending upon the size of the watercraft intended to be lifted.

[042] The three-post/single motor design **100** of further includes a pair of pulley assemblies, each of the pulley assemblies positioned on one side of the proximal vertical piling **301** as well as one of the transverse lifting beams **13**. More specifically, each of the pulley assemblies includes a pulley wheel **32** secured to the parallel plates by a bolt **50** connecting the two plates, as shown in Fig. 14. The pulley wheel **32** is positioned subjacent to the upper bolt 50 connecting the parallel plates **22**. Each of the pulley assemblies further includes a second pulley wheel **34** positioned subjacent to the first pulley wheel **32** and mounted onto another bolt **50**. A third pulley wheel **35** is positioned on each of the transverse beams **13** near the distal vertical piling **302** and held therein by a bolt **50**, as shown in Fig. 12. Preferably, the pulley wheels **34,35** positioned on the transverse lifting beams **13** are mounted within brackets **40** using hollow bolts with zerk fittings **52**, as described above for the first embodiment and illustrated in Fig. 12.

[043] The three post/single motor embodiment **100** further includes a set of second cables **33**, with each cable having one end fixedly secured to one side of the proximal vertical piling **301** below the first end **13b** of the transverse beam. and the second end fixedly secured to and near the top end **302a** of one of the distal side vertical pilings **302**, as shown in Fig. 14. The remaining portion of each of the second cables is aligned, in succession, over the first pulley wheel **32**, beneath the second pulley wheel **34**, along the top surface of the transverse beam, and beneath the third pulley wheel **35** on the distal end **13a** of the transverse beam. As shown in Fig. 2, the second and third pulley wheels **35,36** are mounted within brackets **40** using hollow bolts with zerk fittings **51**. Preferably, from about 26 feet to about 36 feet of cable **30** are used, depending upon the size of the watercraft intended to be lifted by the inventive lifting assembly.

[044] When the motor/winch assembly in this embodiment is actuated via a single switch (not shown) to lift the transverse lifting beams **13**, the cable **200** pulls the plates upward, thereby synchronistically raising the transverse lifting beams **13**. Lowering the transverse beams operates in the same fashion.

[045] Fig. 15 illustrates a third embodiment of a watercraft lift design. In this embodiment, which for ease of explanation is referred to herein as the "four post/dual motor" embodiment **200**, the support structure of the assembly includes a first pair of vertical pilings **211** positioned on the proximal side **P** (i.e. dock side) of the watercraft **W** and a second pair of vertical pilings **212** positioned on the distal side **D** of the watercraft **W**. This embodiment further includes a pair of transverse lifting beams **13**, which in combination with the other features of the invention, may be lowered or raised to accommodate a watercraft. Each of the two lifting beams **13** is positioned between adjacent distal and proximal pilings **211,212**, as shown in Fig. 15. This embodiment includes a pair of winch/motor assemblies **14**, each of which is secured to one of the proximal pilings **212** near the top end **213a** at **500**, as shown. Each of the winch/motor assemblies **14** includes a spool about which a cable **20** is wound. This first cable **20** is wound about each of the spools **15** (see Fig. 20A), with the cable having one end fixedly secured to the spool and a second end fixedly secured to either piling of the first pair of vertical pilings **211** or a portion of the winch assembly on each of the first pair of proximal pilings **211**. The first cable **20** is mounted onto the first pulley wheel **34**, as also described above and illustrated for the first embodiment (i.e. see Figs. 15-16), and serves to raise or lower the pulley wheel **30** via the motor/winch assembly **14**.

[046] A second pulley wheel **34** is housed between a second pair of parallel housing plates **41** and subjacent to the first pulley wheel. Preferably, the second pulley wheel **34** is rotatably mounted on a bolt **50** securing the two parallel plates **41** together. This cable **20** is movably mounted on the first pulley wheel **30** for longitudinal movement upon activation of the motor.

[047] Each of the pulley assemblies further includes a third pulley wheel **34** positioned subjacent to the second pulley wheel **32** on the proximal end **13a** of the lifting beam as well as a fourth pulley wheel **35** positioned on the distal end **13b** of the lifting beam **13**. The third pulley wheel **34** is further rotatably mounted on a bolt **50** secured between the brackets.

[048] The pulley assembly further includes a set of second cables **33**, each having a first end secured to one side of the proximal vertical piling **211** beneath the transverse beam and a second end secured to and near the top of one of the two distal pilings to which it is

adjacent. The second cable **33** is further aligned, in succession, over the second pulley wheel **32**, beneath a beneath the third pulley wheel **34**, along the top surface of the beam, and beneath a fourth pulley wheel **35**, wherein the fourth pulley wheel is mounted to the distal end of each of the elongated beams. Preferably, the third and fourth pulley wheels **34,35** positioned on the lifting beams are mounted within brackets **41** using hollow bolts with zerk fittings **51**, as described above for the first and second embodiments illustrated herein.

[049] To operate the lifting apparatus, two switches actuated to activate the motor and winches of the motor/winch assembly, thereby causing the first cable **20** to raise or lower the two lifting beams, synchronistically.

[050] Fig. 15 illustrates a boat hull **W** (in phantom) positioned on the transverse lifting beams **13**. Preferably, the lifting beams are further connected to one another by a pair of cross beams **300** positioned on the top surface of the lifting beams **13**. Preferably, these cross beams **300** are covered with an artificial turf **301** or other suitable material to prevent slippage and scratching of the watercraft hull or bottom. As shown in Fig. 19, the cross beams may be secured to the transverse beams via an L-bracket **302**, for example.

[051] The present invention is also directed to another cable tie-off design for safely securing the free end of the lifting cable **33** to the vertical piling. As shown in Figs. 18A-18B, the cable **33** is aligned within a grooved wedge **400**. The wedge **400** is configured to fit within the slot **508** of a becket which has been bolted onto the vertical piling. Fig. 18B illustrates an L-shaped becket **500** secured to a vertical piling via bolts **502**. The upward force of the cable during operation of the lifting apparatus causes the wedge/cable combination to lock into the slot **50** within the becket, thereby minimizing any slippage of the cable during operation.

[052] The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials, as well as in the details of the illustrated construction, may be made without departing from the spirit of the invention.